LA-UR-21-21784
Approved for public release; distribution is unlimited.

Title: HSLA-100 Forging Contract Vendor Post-Award Meeting

Author(s): Bingham, Kelly L.
Guffee, Ray M.
Smouse, Thomas Dustin

Intended for: Presentation to be released to forging vendors that gives an overview of LANL's vessel program and needs.

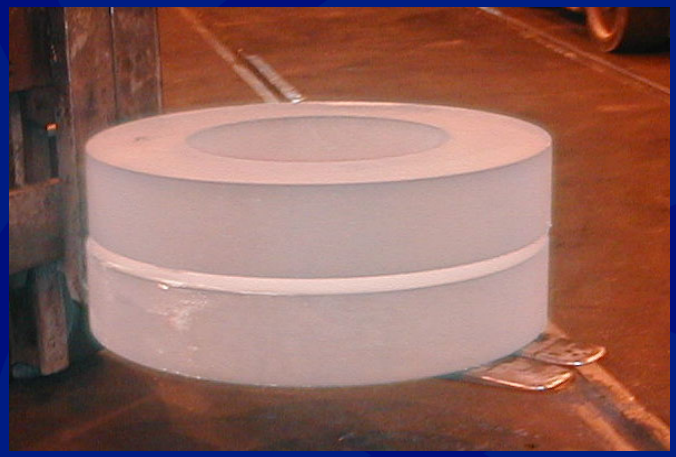
Issued: 2021-02-23

Los Alamos NATIONAL LABORATORY

HSLA-100 Forging Contract Vendor Post-Award Meeting

Ray Guffee, Kelly Bingham, Tom Smouse

February 23, 2021

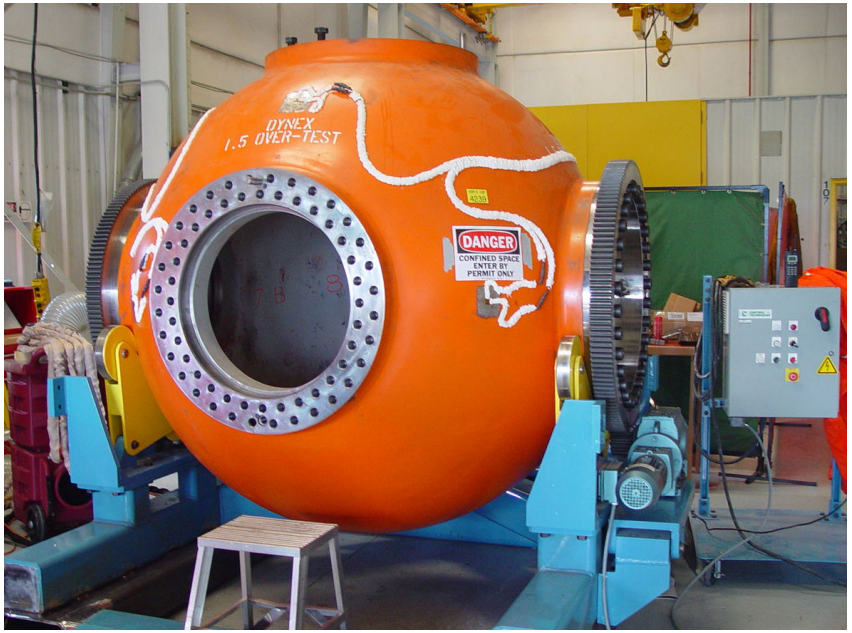


Mission Need

- LANL utilizes thick-walled, spherical vessels for numerous basic science, materials, and system performance experiments
- These pressure retaining vessels are designed and fabricated to meet the intent of ASME B&PV Section VIII, Division 3 and Code Case 2564
- LANL has successfully contracted past production of component parts (nozzle and cover forgings, plate production and head forming) and overall vessel construction (welding, inspection, hydrostatic testing) utilizing HSLA-100 steel
- As current vessel inventories approach design lifetimes, we are once again embarking upon a series of fabrication contracts to produce replacement components and vessel assemblies to ensure continued experiment cadence at LANL
- We anticipate releasing additional future vessel production contracts as experimental demands at LANL continue to increase

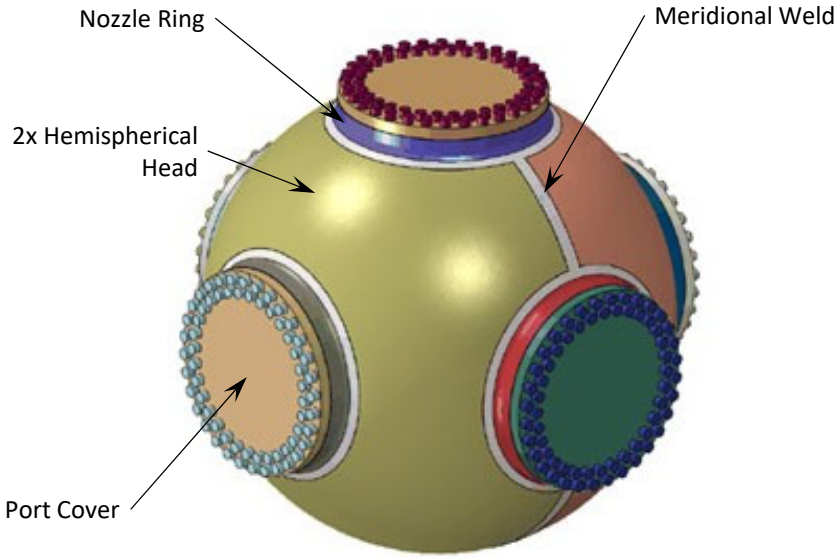
Vessels Utilized at LANL

6’ dia. – 5 port

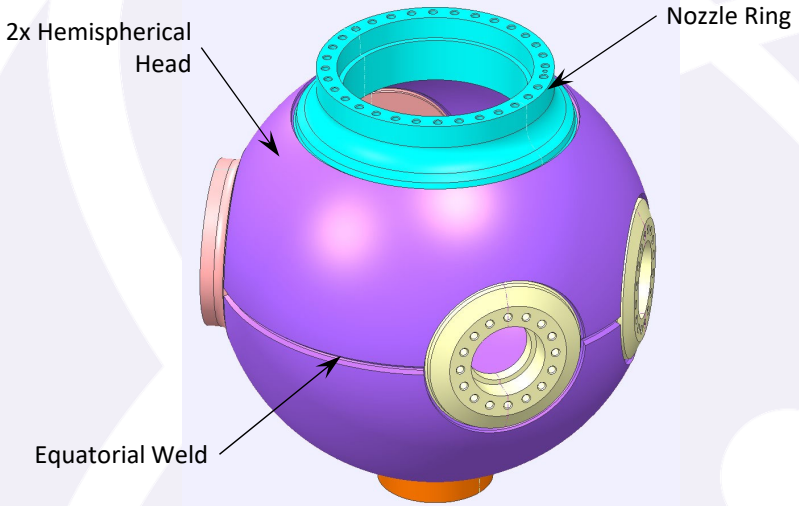


3’ dia. – 5 port

LANL Vessel Configurations



6’ x 2.5” Nom. Wall 5-Port Vessel



3’ x 1.1” Nom. Wall 5-Port Vessel

Vessel Component Parts

Hemispherical Heads
(6’ x 2.5” Nom. and 3’ x 1.1” Nom.)

Nozzle Ring Forgings
(Four Sizes Utilized)

Cover Disk Forgings
(Two Sizes Utilized)

Current Forging Needs

- HSLA-100 Material
  - Material of choice because of strength & toughness
  - Repairable with no post-weld Heat Treatment

6' Vessels – Currently need Forgings for		16	Vessels	
Forged Parts	**Size**	**Qty**	**Part Weight**	**Total Part Weight**
HSLA-100 Nozzle	Ring - 37.67"od x 23.20" id x 6.93"	82	1,400	114,800
HSLA-100 Cover Disks	Disc - 34.62" od x 6.5"	92	1,800	165,600
	Total Qty	**174**	**Total Weight**	**280,400**

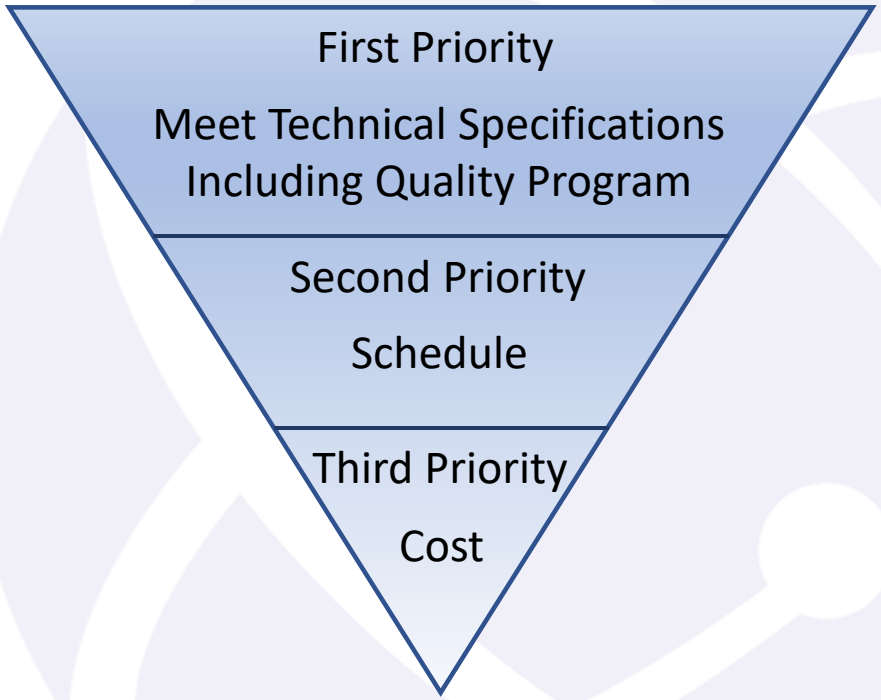
3' Vessels – Currently need Forgings for		9	Vessels	
Forged Parts	**Size**	**Qty**	**Part Weight**	**Total Part Weight**
HSLA-100 Top Nozzle	Ring - 25" od x 15.5" id x 6.4"	11	900	9,900
HSLA-100 Top Cover	Disc - 22" od x 6"	11	540	5,940
HSLA-100 Enter Nozzle	Ring - 17.1" od x 5.2" id x 3.8	18	300	5,400
HSLA-100 Exit Nozzle	Ring - 16.5" od x 9.48" id x 3.30"	18	280	5,040
HSLA-100 Base Ring	Ring - 11" od x 5.4" id x 4"	9	126	1,134
	Total Qty	**67**	**Total Weight**	**27,414**

Contract Overview and Structure

- Current contract is for First Article fabrication, testing, and acceptance of representative forgings
  - 6’ vessel nozzle forgings – 2x
  - 6’ vessel cover forgings – 2x
- Vendor must successfully meet all First Article technical performance criteria and have an approved quality program to be eligible/qualified for follow-on production contracts
- Anticipate awarding production contracts after First Article phase is complete
  - Production and acceptance of a minimum of 174 - 6’ forgings (final contract number contingent on technical evaluation criteria and number of contracts awarded)
  - Production and acceptance of a minimum of 67 – 3’ Forgings (final contract number contingent on technical evaluation criteria and number of contracts awarded)
- Successful First Article does not guarantee award of production contract
  - Award will be based on proposed production schedule, cost, and vendor’s First Article technical performance

Qualification for Production Contract

- First Article
  - RFQ to develop your process to meet our requirements
  - Acceptable First Article technical performance
- Approved Vendor Quality Program
  - Verified during First Article phase
  - Must be established/approved prior to production award
- Award production to meet schedules
  - Production forgings follow the process developed during First Article



Summary of Technical Requirements

Specified Characteristics	Requirements	Verified by
First Article	To establish means & methods of production	See items below as well as LANL Specification ENG-TS-J2-1436
Material Chemistry	Tech Pub T9704 HSLA-100 Comp 3	Chemistry & Microstructure Analysis, Prior Austenite Grain Size, CMTR's
Mechanical Properties	Strength, Hardness, Ductility, Toughness	Tensile, Brinell Hardness, Charpy Impact, Charpy Transition Curves Dynamic Tear Test, & CMTR's
Soundness	Lack of voids & process defects	Wet Magnetic Particle & Ultrasonic Testing
Geometry	Fit & form must meet LANL drawing requirements	Inspection & Test Reports
Process Control	QA Program, Submittals, Travelers, Procedures, Instructions and Qualification/Certifications	Vendor QA Program Qualification, Surveillance, Inspection & Test Reports

Summary of Submittals & Requirements

Submittal	LANL Approval Required	LANL Review and Comment Before Proceeding
Subcontractor Quality Assurance Plan (QAP)	X	
An Inspection and Test Plan (Traveler) that complies with Subcontractor's QAP for approval by LANL. Subcontractor shall prepare a comprehensive plan that includes all manufacturing steps, inspections and tests required by this specification, codes, and standards applicable to the subcontract. This plan shall include a schedule of activities and will be used by LANL to establish witness and hold points. (prior to use)	X	
First Article Test plan (when required by subcontract documents). First Article Test plan shall be developed by the subcontractor for LANL review and approval.	X	
Process Control Plan (prior to use)		X
All Inspection, Examination and Testing Procedures (prior to use)		X
Documentation required by Inspection and Test Plan such as logs and results of tests and inspections performed shall be submitted for review and comment.		X
Heat Treatment Procedure		X
Cleaning and Preservation Procedure		X
Supplier Audit/Assessment Reports (If applicable)		X
Starting material certificate(s) (if applicable)		X
Nonconformance Reports (NCRs)	X	
Certificate of Conformance	X	
CMTRs for each HSLA-100 steel forging shall be submitted for acceptance and shall include the following minimum information: • Purchase order number • Name of the forging Manufacturer • LANL Specification number and revision • Melt processes used • Forging Heat number and Serial number • Revision of Process Control Plan used • Chemical Composition • Heat treatment times and temperatures and cooling methods if required • Tensile Test Results • Toughness Tests Results • Brinell Hardness Test Results • Non-destructive examination (NDE) and other inspection reports (including RT film, if applicable) • Date of Manufacture	X	
Shipping, Handling, and Packaging, Procedure		X

Timeline

Contract Introduction Meeting Feb. 23rd

- Vendors QA Program Review – Submit QA Program to LANL ASAP
- Coordinate with vendor to review, comment & approval of required submittals
- Note required notification to LANL of
  - NCR's
  - Witness & hold points
- Coordinate with vendor for LANL witness and hold points

Questions and Contacts

- Contract Questions:
  - Letitia Espinosa
  - lme@lanl.gov
  - 505 695 6209 Cell
  - 505 606 1606 Work

- Technical Questions
  - Ray Guffee
  - guffee@lanl.gov
  - 505 667 1374 Work

- QA Questions:
  - Kelly Bingham
  - kellyb@lanl.gov
  - 505 620-9628 Cell

Backup Slides

Current Vessel & Component Needs

Current 6' Vessel Component Needs

Vessels Needed					16	By	Mar. - 22
Description	**Qty/vessel**	**Part Size**	**lbs/ piece**	**lbs / vessel**	**Qty PO**	**Weight PO**	**Tons PO**
HSLA-100 Hemi-Heads	2	2.625" x 72" id.	6,800	13,600	33	224,400	112.2
HSLA-100 Nozzle	5	37.7" od x 23.2" id x 6.9"	1,400	7,000	82	114,800	57
HSLA-100 Cover Disks	5	34.7" od x 6.5"	1,800	9,000	92	165,600	83
Weld Metal lbs	916	Double U Joint Weld Filler	916	916	10,997	10,997	5.5
		Total weight/ Vessel		**30,516**	**Weight/ PO**	515,797	257.90

Current 3' Vessel & Component Needs

Vessels Needed					9	By	Dec. -22
Description	**Qty/Vessel**	**Part Size**	**lbs/ piece**	**lbs / vessel**	**Qty PO**	**Weight PO**	**Tons PO**
HSLA-100 Hemi-Heads	2	1.25" x 36" dia.	900	1,800	19	17,100	8.55
HSLA-100 Top Nozzle	1	25" od x 15.5" id x 6.4"	600	600	11	6,600	3.30
HSLA-100 Top Cover	1	22" od x 6"	540	540	11	5,940	2.97
HSLA-100 Enter Nozzle	2	17.1" od x 5.2" id x 3.8	300	600	18	5,400	2.70
HSLA-100 Exit Nozzle	2	16.5" od x 9.48" id x 3.30"	280	560	18	5,040	2.52
HSLA-100 Base Ring	1	11" od x 5.4" id x 4"	126	126	9	1,134	0.57
Weld Metal lbs	121	Double U Joint Weld Filler	121	121	1,089	1,089	0.54
		Weight/Vessel		2,547	**Weight/ PO**	25,203	12.60

Future Vessel & Components Needs

Future 6' Vessel Needs							
Additional 6' Vessels Needed					6	By	Mar. - 25
Vessel Components							
Description	Qty/vessel	Part Size	lbs/ piece	bs / vesse	Qty	Weight	Tons
HSLA-100 Hemi-Heads	2	2.625" x 72" id.	6,800	13,600	13	88,400	44.2
HSLA-100 Nozzle	5	37.7" od x 23.2" id x 6.9"	1,400	7,000	32	44,800	22.4
HSLA-100 Cover Disks	5	34.7" od x 6.5"	1,800	9,000	32	57,600	28.8
Weld Metal lbs	916	Double U Joint Weld Filler		916	12	10,997	0.0
		Total weight/ Vessel		**30,516**	**Weight**	201,797	95.41

Future 3' Vessel Needs							
Additional 3' Vessels					9	By	Dec. -25
Vessel Components Needed							
Description	Qty/Vessel	Part Size	lbs/ piece	bs / vesse	Qty	Weight	Tons
HSLA-100 Hemi-Heads	2	1.25" x 36" dia.	900	1,800	19	17,100	8.55
HSLA-100 Top Nozzle	1	25" od x 15.5" id x 6.4"	600	600	10	6,000	3.00
HSLA-100 Top Cover	1	22" od x 6"	540	540	9	4,860	2.43
HSLA-100 Enter Nozzle	2	17.1" od x 5.2" id x 3.8	300	600	18	5,400	2.70
HSLA-100 Exit Nozzle	2	16.5" od x 9.48" id x 3.30"	280	560	18	5,040	2.52
HSLA-100 Base Ring	1	11" od x 5.4" id x 4"	40	40	9	360	0.18
Weld Metal lbs	121	Double U Joint Weld Filler		121	1,089	1,089	0.54
		Weight/Vessel		2,461	**Weight**	22,749	11.37